REMARKS

This paper is responsive to the non-final Office Action issued April 14, 2009. Reconsideration and allowance of claims 2-6 and 8-22 are requested.

The Office Action

Claims 2-5 and 10-12 stand rejected under 35 U.S.C. § 101.

Claims 6, 13, and 14 stand rejected under 35 U.S.C. § 112, first and second paragraphs, and under 35 U.S.C. § 103 as being unpatentable over Lipinski ("Expectation Maximization", IEEE Article).

Claims 8 and 9 stand rejected under 35 U.S.C. § 102 over Lipinski.

Claim 10 stands rejected under 35 U.S.C. § 103 as being unpatentable over Lipinski in view of Ohba (WO 01/59477; US 7,191,109).

Claims 5 and 11 stand rejected under 35 U.S.C. § 103 as being unpatentable over Lipinski as modified by Ohba, as further modified by Wollenweber (US 6,590,215).

Dependent claims 2-4 and 12 do not stand rejected on art and are understood to contain allowable subject matter once the 35 U.S.C. § 101 rejection is resolved.

35 U.S.C. § 112

Claim 6 has been broadened to eliminate the first tomographic image data acquisition means and the second tomographic data acquisition means which the Examiner asserted lacked antecedent basis. With the elimination of these means, it is submitted that claim 6 and the claims dependent therefrom comply fully with the requirements of 35 U.S.C. § 112, first and second paragraphs.

35 U.S.C. § 101

Claim 10 has been amended in accordance with the Examiner's observations in paragraph 14 of the Office Action to specifically recite an imaging apparatus.

Request for Complete Copy of Lipinski

The copy of Lipinski sent with the Office Action eclipsed the last one or more lines of pages 130-135.

The References of Record

Lipinski is directed to a technique which is materially different technique than the technique disclosed in the present application, which operates in a materially different way, and which achieves a materially different end result. When PET images are reconstructed using any of the several iterative reconstruction algorithms compared in Lipinski, they tend to be relatively fuzzy, particularly they lack strong delineation of borders (Abstract). These iterative techniques operate with various mathematical constraints to help them converge more quickly or more accurately on a stable solution. In order to make the borders or edges sharper or more noise free, Lipinski proposes to add an additional constraint based on a segmented MR image.

Specifically, Lipinski segments an MR image to define the edges or borders between anatomical areas. In a typical PET reconstruction using these techniques, the PET image would be fuzzy along such borders. That is, some of the PET data will be shown as falling on the other side of the border, e.g., overflowing the border. Lipinski assumes that the PET activity level in each segmented region will be relatively constant. Lipinski uses the segmented borders of the MR scanner to preferentially push PET image data events into areas of higher activity and out of the areas of lower activity. Overly simplified, Lipinski constrains or moves PET events which fall just outside the border of a high activity segmented area from the low activity segmented area in which they would otherwise fall over into the high activity area. In this manner, Lipinski uses the borders of a segmented high resolution image in order to achieve a PET image with sharp borders.

The Present Application

The present application is addressing a different problem in a different way and achieves a different end result. As indicated on page 2 of the present application, in iterative backprojection reconstructions, each projection line is

distributed or smeared across the entire imaging region during backprojection. In each iteration, the projection data lines are distributed or smeared across the entire image region and then forward projected or otherwise reconstituted back into data lines. Repeating this backprojection and reforming into data lines a multiplicity of times over a multiplicity of iteration causes image degradation. Moreover, it causes prolonged calculation times.

The present application proposes to identify only a subregion of interest in a high resolution image, e.g., by segmentation. Then, during iterative reconstruction of the low resolution image data, the iterative backprojection is limited only to the portions of the data which contribute to the selected region. In this manner, the backprojection is not calculated across an entire image region. Rather, the backprojection is limited to an image region of interest which is selected in advance, e.g., during the segmentation of the high resolution image. In this manner, the image values are not smeared or distributed across the entire image region, but rather across a smaller, selected image region. In this manner, the signal-to-noise ratio is increased and the quality of the images is enhanced (page 3, lines 3-7).

The Claims Distinguish Patentably Over the References of Record

Claim 6 calls for a selecting means for selecting a portion of the first image data set situated in a selected image region. In **Lipinski**, all of the PET image data is used. No selection is made of a portion of the PET data corresponding to a selected image region.

Claim 6 further calls for a backprojection means for reconstructing a first tomographic image exclusively from the portion of the first image data set which is situated in the selected region. By contrast, Lipinski reconstructs the PET image based on all of the PET image data set.

Accordingly, it is submitted that **claim 6 and claims 13-14 dependent therefrom** are not obvious over Lipinski.

Claim 8 calls for segmenting the first image data set. Lipinski does not suggest segmenting the PET image data set, only the MRI image data set.

Claim 8 further calls for reconstructing a first tomographic image exclusively from the segmented first image data set. By contrast, Lipinski generates a

PET image from an entire PET data set with enhanced edges due to constraints imposed during the iterative reconstruction imposed by borders determined by segmenting an MRI image. Accordingly, it is submitted that **claim 8 and claims 15-16 dependent therefrom** are not anticipated by Lipinski.

Claim 9 calls for selecting a region to be imaged in the second data set. Although Lipinski segments the MRI data set, Lipinski does not select a region to be imaged. Rather, Lipinski proposes to use the border information of the entire data set.

Claim 9 further calls for calculating the image reconstruction from the image data in a region represented in the first image data set that corresponds to the selected region. By contrast, Lipinski reconstructs the entire PET data set using the borders from the MRI image to enhance the definition of borders in the reconstructed PET image of the entire imaged volume. Lipinski does not suggest reconstructing only a selected region.

Accordingly, it is submitted that **claim 9 and claims 17-19 dependent therefrom** are not anticipated by Lipinski.

Claim 10 calls for segmenting the second image data set to define a segmented second image. Lipinski segments the MRI data set to generate the borders of various tissues in the MRI image. However, claim 10 further calls for forward projecting the segmented second image to form a segmented second image data set. Lipinski makes no suggestion of forward projecting the segmented MRI image. In the techniques described in Lipinski, there is no apparent reason why or what purpose such a forward projection would serve.

Ohba, at column 8, line 57, relates to projecting the PET data, not the MRI data. Accordingly, Ohba fails to cure this shortcoming of Lipinski.

Claim 10 further calls for associating the second segmented image data set with the first image data set to form a segmented first image data set. Lipinski associates the borders of the reconstructed MRI image in the form of constraints, but does not deconstruct the MRI image back into MRI data sets, nor does Lipinski associate MRI data set with PET data sets, nor does Lipinski segmented the PET data set.

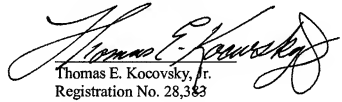
Claim 10 calls for reconstructing the segmented first image data set. By contrast, Lipinski reconstructs the whole PET data set. There is no segmented first image data set in Lipinski to reconstruct. Accordingly, it is submitted that **claim 10 and claims 2-5, 11, 12, and 20-22 dependent therefrom** distinguish patentably and unobviously over the references of record.

CONCLUSION

For the reasons set forth above, it is submitted that claims 2-6 and 8-22 are not anticipated by and distinguish patentably over the references of record and meet all statutory requirements. An early allowance of all claims is requested.

In the event the Examiner considers personal contact advantageous to the disposition of this case, the Examiner is requested to telephone Thomas Kocovsky at 216.363.9000.

Respectfully submitted,



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